City of Cambridge

Community-Based Recycling Outreach Participation Project

Sponsored by MA DEP Technical Assistance Grant
Final Report – August 2003

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I. Executive Summary

Project Description

Describe your project and the waste reduction need it addressed.
The Community-Based Recycling Outreach Partnership Project was designed to implement and evaluate outreach techniques based on principles of social marketing and pro-social behavior to increase recycling participation among identified "non-recyclers". For example, will residents who may not know the direct benefits of recycling, recycle to benefit a community group? In *Fostering Sustainable Behavior,* Doug McKenzie-Mohr and William Smith provide this description of community-based social marketing:

Community-based social marketing is based upon research in the social sciences that demonstrates that behavior change is most effectively achieved through initiatives delivered at the community level, which focus on removing barriers to an activity while simultaneously enhancing the activities benefits. This involves four steps:

1. *Identify the barriers and benefits to an activity*
2. *Develop a strategy that utilizes "tools" that have been shown to be effective in changing behavior*
3. *Pilot the strategy*
4. *Evaluate the strategy once it has been implemented across a community.*

The City hired Rick Innes of Clear View Consulting (CVC), who identified a sample of 567 "non-recycler" households and conducted follow-up monitoring of recycling participation by the identified households (HHs). Each building was randomly assigned to one of four outreach methods: phone, door-to-door, mailed brochure and a control group. Phone and door-to-door outreach activities to non-recyclers were conducted through partnerships with two local charitable groups: Summerbridge Cambridge A Breakthrough Program and Cambridge Little League Baseball: East Division. Follow up monitoring of non-recycling households would be completed by CVC.

Both charity groups asked the "non-recycler" HHs to make a commitment to recycle. Those that did, were asked to fill out a commitment card stating which recyclables they planned to recycle and were given the option to have their name appear in the local newspaper as a supporter of the charity and this project. Eleven residents chose to be recognized in this way and the names appeared in the Cambridge Chronicle on 8/28/02 (Attachment T). The charitable partners earned money for their initial outreach efforts and received $30 per ton recycled by the HHs contacted.

Recycling participation and behavior was monitored three months and one year after the initial outreach. During monitoring, field staff noted the total number of recycling set outs for each building, the weight of the recycling set outs and which specific units are recycling.

By quantifying the impact of various outreach techniques, this project attempted to identify the most effective method to increase residential recycling participation, thereby increasing the City's recycling rate and decreasing waste land-filled or incinerated.

What were the goal(s) of the project or what did you hope to achieve?
The overall project goal was to implement and evaluate outreach techniques designed using principles of social marketing. Through direct outreach to "non-recyclers", the Project aimed to provide answers to the following questions about what type of outreach techniques are effective and why:

1. Are non-recyclers receiving a direct appeal to recycle, coupled with an opportunity to support a charitable group more likely to begin recycling than non-recyclers who receive only a flyer, or no contact at all?
2. Is there a correlation between a particular outreach mechanism and observed recycling behavior?
3. What is the average annual recycling tonnage for new recyclers?

4. What is the “drop-out” rate among HHs who initially commit to recycling? After 3 months? One year?
5. What % of non-recyclers giving a written commitment to recycle is observed to be recycling one year later?
6. What % of non-recyclers receiving only a recycling brochure become habitual recyclers?
7. What % of non-recyclers are we able to contact by phone to deliver an appeal to recycle?
8. What % of non-recyclers are we able to contact in person to deliver an appeal to recycle?

Cambridge Recycling In 2002

The City of Cambridge, like many municipalities, faces the ongoing challenge of increasing our recycling rate. The City currently offers curbside recycling service to all residential and multi-family dwellings. Recyclables are collected once per week on the same day as trash. The City accepts a wide range of papers and containers, including boxboard, junk mail, aerosol cans and any stiff plastic container. Residents are asked to separate papers from containers, either by using separate bins or by bundling papers. Recycling tonnage (paper, cardboard and containers) has grown from 646 tons in 1990 to 8863 tons in 2003. At the start of this project, the City proposed to increase its 33% recycling rate by increasing the number of households participating in the curbside recycling program.

Research has shown that programmatic variables such as curbside, weekly, collection, & pay-per-bag have a positive correlation with recycling participation. The City has attempted to reduce the external barriers to recycling, by adopting all those programmatic variables that are logistically, politically, and economically feasible (see Table 1). Still, barriers to participation remain, many of which cannot be solved by programmatic changes.

Barriers To Recycling

Self reported barriers of Cambridge non-recyclers fall into three general categories: convenience, motivation and information (See Table 2). This information comes from three Focus groups conducted by the City of Cambridge in 1997 among non-recyclers living in the Eastern third of the City.

We have little control over external barriers such as: 'lack of space for bins' or 'bins get stolen'. Conversely, motivational barriers such as 'no direct benefit perceived' provide fertile ground for our Project. In some cases the perception that recycling is inconvenient may be overcome by engaging the person in the behavior. This Project is primarily designed to enhance the perceived benefits of participating in the curbside recycling program.

Hypothesis

Non-recycling households receiving a phone call or door-knock, informing them of the opportunity to support a local youth group by recycling for one year, are more likely to start recycling than non-recycling households who receive only a brochure or no contact at all.

Table 1. Summary of programmatic variables affecting participation (P) and capture (C), including feasibility (F) of implementing variables not in place in Cambridge

Currently in Place in Cambridge			Not in place in Cambridge			
Variable name	↑ P	↑ C	Variable name	↑ P	↑ C	F?
GENERAL						
Mandatory recycling[1]	√	√	Pay-as-You- Throw[3]	√	√	No
Curbside collection[2]			Allow plastic bags	?	?	No
Collection frequency and day same as trash[3]	√	√	Co-collection of trash and recycling	?	?	Maybe
Collect plastics #1-7[3]	√	√	Provide individual bins to apartment dwellers	?	?	Maybe
Supply free bins	?	?	Wet/dry collection	?	?	
Recycling bins delivered	?	?	Cardboard any size		√	
Apartment dwellers have on-site recycling	√	√	Single stream collection (i.e. papers and containers mixed)[4]	√	√	Maybe
Providing information about how to participate[5]	√					

[1] Everett, J.W & J. Pierce. "Curbside Recycling in the USA: Convenience and Mandatory Participation." Waste Management & Research 11 (1993) 49-61.
[2] Skumatz, Lisa. "Nationwide Diversion Rate Study- Quantitative Effects of Program Choices on Recycling and Green Waste Diversion: Beyond Case Studies." July 1996. (206) 624-8508.
[3] Buwalda, Tim. "Rising Above the Plastics Plateau." *Recycling Today* January 2002: 66-72.
[4] Oskamp, Stuart et al. "Commingled versus Separated Curbside Recycling: Does Sorting Matter?" *Environment and Behavior* 28.1 (1996) 73-92.
[5] Davio, Rebecca. "Curbside Collection Participation: Influences and Motivations." *Resource Recycling* August 2001: 12-17.

Table 2. Self-Identified Barriers to Recycling in Cambridge

Convenience		Motivation	Information
PROGRAM	Bin gets left behind if you don't do it right Poor collection service Open bin leads to privacy concerns Noise from scavengers	Not convinced it does anything significant No direct benefit perceived Unconvinced that the City thinks it's important Laziness	Brochures are too complicated and long
PERCEIVE	Recycling is a hassle • Takes too long • Too many steps • Requires too much thought May attract pests		
APPEAR	Bins get yucky and dirty quickly It doesn't look good		
	Bins get stolen Lack of space to put recycling bin		

Definitions

- BUILDING: One or more addresses where occupants set-out recycling in the same location.
- COMMITTER: An identified non-recycler who makes a commitment to recycle in response to a direct appeal made by a charitable group.[6]
- HOUSEHOLD: the people (related or not) who occupy a single housing unit within a building
- RECYCLING SETOUT: recyclable items from one household placed out in one or more blue bins and/or in paper bags.
- NON-BIN SETOUT: recyclable items placed outside of a bin in a bag or box. This can be either in addition to a recycling bin setout or instead of a bin.

[6] This definition has been modified from the definition used in the original grant proposal.

Project Results

Did the project accomplish the goals you set out to accomplish or answer the questions you were trying to answer? If no, why not? If yes, what did you accomplish? What conclusions did you come to? Please provide any numerical data to support your results.

Please see Attachments A-D by CVC for detailed answers and statistics on all of the following questions:

1. **Are non-recyclers receiving a direct appeal to recycle, coupled with an opportunity to support a charitable group more likely to begin recycling than non-recycles who receive only a flyer (or no contact at all)?**

2. **Is there a correlation between a particular outreach mechanism, and observed recycling behavior?**

Results for the "door committers" strongly suggest that outreach in person had a meaningful impact. However, this conclusion is dependent upon assumption about background effects that could not be directly measured. Particularly in light of the 12-month results, the result for the "phone committers" should not be considered statistically significant, but rather strongly suggestive of meaningful results from the outreach effort. For further details, see Attachment B.

3. **What is the average annual recycling tonnage for new recyclers?**

Based on the limited sample described above, we found an average of 0.18 tons annually projected for each new recycling household.

4. **What is the "drop-out" rate among HHs who initially commit to recycling? After 3 months? One year?**

Among the 34 "committers", 18 were found to be recycling after 3 months, so 16, or 47% had dropped out. Alternatively, some "committer" HHs may have possibly never started at all. After 12 months, 15 were found to be recycling, so 19, or 56% had dropped out.

5. **What % of non-recyclers giving a written commitment to recycle is observed to be recycling one year later?**

Out of a total of 34 "committers", we estimated that 15, or 44% were still recycling a year later. Of these, 5 HHs were specifically identified participants; the others were all "maybes", albeit ones that we can be fairly confident about because of the conservative methodology used. We found 1 of the 15 recycling was a "Phone Committer" and 14 of the 15 were "Door Committers" still participating. Of course, some of these HHs may have "turned over" during the intervening year and may have been replaced by other recyclers. For a detailed discussion of this phenomenon see Attachment B.

6. **What % of non-recyclers receiving only a recycling brochure become habitual recyclers?**

We were able to document 14%, above the "before" or background participation level. This is not statistically distinguishable from the effect observed in the control group, which is believed to be mostly due to household turnover.

7. **What % of non-recyclers are we able to contact by phone to deliver an appeal to recycle?**

The outreach effort contacted 52 out of 131 HHs in the phone group, or 40%. This contact rate was compromised from the outset by the difficulty in obtaining phone numbers for almost half of the HHs originally assigned to this group.

8. **What % of non-recyclers are we able to contact in person to deliver an appeal to recycle?**

The outreach effort contacted 96 out of 133 HHs in the door group, or 72%.

II. Project Overview

Goals & Objectives

List the specific goals and objectives that you set out to achieve in undertaking this project.
We set out to acquire answers to the questions outlined in the Project Description section above.

In addition, DPW was concerned with how our annual outreach budget is spent. We send out two informational brochures annually, one on recycling and the other on yard waste. These mailings total close to $10,000 for over 45,000 HHs. We were interested to evaluate whether this is the best use of our money and whether other outreach methods could be more fruitful in increasing participation.

Tasks Completed

List the specific tasks you performed to achieve your goal(s) or answer your question(s). (Please provide enough detail to allow future grantees to replicate your work and follow the steps you took in your project.)

The tasks performed for this project included:

1. Identification of Non-Recyclers (HHs= households)
Initial data, including street number, street name, number of units, and approximate time that recycling was picked up in the area, was gathered for 2352 HHs in 956 buildings.

The number of units for each building in the sample was determined by counting mailboxes, doorbells and/or electric meters. Buildings were assigned to one of three monitoring routes and arranged so that the field assistants would be able to stay ahead of the recycling trucks.

Each building in the sample was monitored for at least 4 weeks. Field assistants began monitoring slightly before the recycling trucks started their routes at 7am on collection day. They were trained to discern and record the number of recycling setouts for a given building. (See Attachment S)

Buildings with more than 25% participation were dropped from the study. Participating HHs in buildings with less than 25% participation were included in our study sample when we were unable to positively identify which household in the building was participating. Field staff labeled all blue bins they observed with a sticker, enabling identification of previously monitored bins in future weeks of monitoring. (See Attachment L)

2. Initial Outreach Conducted by Charity Group Volunteers to Non-Recycler HHs (Phone, Door, Brochure, Control)

Phone Outreach Group
Phone numbers for HHs assigned to this group were obtained primarily from the City's Reverse 911 database, version 5.0 of the re-branded, commercially available database sold by Sigma-Micro Corporation. The Reverse 911 list was augmented by surveying mailboxes and doorbells for last names and then looking up these names in the phone book.

Volunteers phoned these HHs. Calls were made between 4pm-8pm Monday-Thursday, and 11am-6pm on Saturdays. Three attempts were made to contact each household, with at least one weeknight and one Saturday attempt. Each volunteer was provided with a list of phone numbers. When someone answered the phone, volunteers read the following introduction:

> *"Hi, my name is _____. I am calling on behalf of [partner]. The reason I am calling is to ask you to participate in the City's recycling program. Would you like to hear how your recycling efforts could help [partner]. "*

If the person agreed to hear more, the volunteer read the commitment card. (Attachment I-J) Within one week, all HHs that made a commitment received blue bins labeled with address and unit number, a two-sided Information Sheet with simple recycling instructions and a list of "Frequently Asked Questions" and a copy of the commitment card.

If a volunteer encountered a non-English speaking person they asked to speak with an English-speaking adult. If none was available they asked the person what language they spoke and recorded this information. Only one Portuguese speaking resident was identified. Unfortunately, because we did not have any Portuguese-speaking volunteers, we did not follow up with this resident. (See Attachment I-K)

Door Knocking Outreach Group

To avoid contacting the same HH twice, recycling staff surveyed all of the buildings in the door-knocking method and assigned a "bell identification" to each HH record. Bell identification information was provided to volunteers in lieu of a unit number (i.e. Top, bottom, etc).

On the day of outreach, each volunteer received a list of addresses to contact. Volunteers visiting these HHs were between the ages of 8-16. All were accompanied by an adult chaperone. Door knocking outreach was done between 4pm-8pm Monday-Thursday, and 11am-6pm on Saturdays. Three attempts were made to contact each HH, with at least one weeknight and one Saturday attempt. The following introduction was read to the person answering the door:

> *"Hi my name is _____, and this is _____, we are here representing [partner]. We are going door to door today asking people to participate in the City's recycling program. Would you like to read how your recycling efforts can help [partner]?"*

If the person agreed to hear more, the volunteer offered them the commitment card. If the person signed the Commitment Card, the volunteer offered the person a two sided Information Sheet with simple recycling instructions on one side and a list of "Frequently Asked Questions" on the other. All HHs that made a commitment received blue bins (labeled with address and unit number), another copy of the Information Sheet and a copy of the commitment card within one week.

The introduction, commitment card and Information Sheet were all translated into Portuguese. If a volunteer encountered a Portuguese household they were instructed to provide the person with the translated version of the outreach materials. (See Attachment I-K)

Brochure Outreach Group

HHs assigned to this group received the City's graphic recycling brochure. (Attachment F) This brochure was a simplified version of the traditional text-heavy recycling brochure. Focus group strongly favored its design due to its readability and clear instruction. Following the mailing, DPW tracked which HHs in the brochure outreach group requested blue bins.

Control Group

The control group received no verbal or written contact.

3. Development of the *Estimation Guide (Attachment V-W)*

CVC completed the *Guide to Estimating Numbers and Weights of Recycling Set-outs in Dense Neighborhoods*, which was developed to try to standardize estimation procedures of recycling setouts in urban communities. Although the *Guide* was not part of the original work plan, it was identified as a necessary component of the Project during Phase 1 monitoring.

DPW joined CVC in the field to weigh recycling set outs and tally the frequency of different scenarios. These observations helped create an outline of common scenarios in the guide. The guide is divided into three sections: Estimating Numbers of Recycling Setouts, Estimating Weights of Recycling Setouts and Practice Photographs. The Guide may also be useful to measure recycling participation and/or per-household diversion rates.

4. Two 5-Week Monitoring Periods of the Non-recycler households (3-months and 12-months after initial outreach)

CVC hired field assistants to assist monitoring the 567 non-recycling HHs selected. Field staff noted the total number of recycling set outs for each building, the weight of the recycling set outs (estimates and actual) and which specific units were recycling. (Attachments Q-R) Field staff placed stickers on unmarked bins so that previously monitored bins could be identified in future weeks. Recycling setouts were weighed 2 weeks out of 5 with a portable scale and field staff estimated setout weights 3 weeks out of 5 with the *Estimation Guide's Field Summary Sheet*. Field assistants were familiarized with the *Estimation Guide* during a separate training, before monitoring begun.

The study area was divided into two routes and weighing took place as follows:

	Route A	**Route B**
Week 1	Estimate	Scale
Week 2	Scale	Estimate
Week 3	Estimate	Scale
Week 4	Scale	Estimate
Week 5	Estimate	Estimate

Estimating Weight of Bin Using Attachment X

Actual Weighing of Bin Using Attachment R

See Attachments D-E for further explanations of the monitoring procedures.

5. Merge of Clear View's Database with DPW Database.

CVC delivered a Lotus Approach file with the monitoring results to the DPW at the end of each five-week monitoring period. CVC entered monitoring data in a separate database because the study design required CVC staff to be "blind" as to which households were in which outreach groups and subgroups. Therefore, CVC's database was merged with DPW's existing database. (Attachments P)

6. Analysis of Monitoring Results for Each Outreach Group.

Both the 3-Month and 12-Month progress reports were developed before CVC and DPW decided to drop 56 HHs from the study. See Item 9 for further explanation of this.

See Attachments B and D for further explanations of the monitoring results. However, due to the buildings dropped from the study, the reader should not refer to the results quoted in the 3-Month Status Report.

3-Month Analysis

There was a noticeable increase in participation, among HHs contacted by volunteers, from less than 6% before outreach to more than 20%. This increase is primarily attributed to HHs who "committed" to recycle when contacted either by phone or door knocking. Smaller increases were observed among the subgroups of HHs who were contacted but did not commit. A still smaller increase was

observed in the control group and those HHs in the brochure group. However, this increase may be due to household turnover.

The quantities of materials being recycled varied widely. A significant number of HHs were recycling rather small weights of material, which may support a hypothesis from previous studies that many non-recycling HHs have less to recycle. Setout frequency for many HHs in the study was also unusually low, which may be another manifestation of having little to recycle, or of an incomplete understanding of materials to recycle.

12-Month Analysis

Increases in setout rates, overall participation, and average weights of setouts were found in all outreach groups. Participation across all HHs rose from 20.2% in the 3-month monitoring period to 25.2%. Again, a portion of this increase could be attributed to HH turnover.

As before, the West route had higher participation than on the East, at 26.6% versus 23.8%. However, this represented a significant climb on the East route, up from 17.7% during the 3-month monitoring. The 3-month participation on the West route had been 22.7%.

Setout rates for the entire study area averaged 11.5%, varying from 9.9% on May 15th to 13.9% on May 22nd. Impending moves and upcoming vacations over the Memorial Day weekend most likely affected the latter number. Average setout rates on the West route were quite stable, averaging 13.5% and ranging from 12.9% to 14.3%. On the East route, setout rates were much more variable, with an average of 9.5%, a low of 6.4%, and a high of 14.2%.

7. Feedback to Households that made a Commitment to Recycle.

DPW sent letters to committing HHs three months and one year after the initial outreach. (Attachments M-N) The first letter thanked the HH for participating, reminded them that their recycling efforts supported the Charity and stated how much money the Charity earned to date due to their recycling efforts. The second letter thanked the HH for their support, reported the total amount earned by the Charity and described ways that recycling benefits people and the environment.

8. Calculation and payment to charitable groups for amount recycled by households contacted.

Using the average tonnage per HH, 0.18 (Attachment A10), DPW simply multiplied this amount by the number of "committer" HHs contacted by each individual charity and then multiplied that amount by $30. Attachment A10 shows actual recycling tonnage for the "committer" HHs that were contacted by both charity groups and the average tons per HH.

The original contract with the charitable groups stated that the City would award them $12.50 for every ton recycled by the "committer" HHs contacted. After realizing that the payment for the charitable groups after the 3-month monitoring was extremely low, the City increased the payment per ton to $30.

9. **Determination of specific buildings to drop from the study before the 12-month monitoring began due to observed vacancy, renovations, etc.**

14 buildings were dropped from the study because they were found to no longer fit the study criteria. These buildings contained 56 HHs, about 10% of the original study group. Most HHs dropped from the study were observed to not be recycling participants. This tended to slightly raise setout rates, average setout rates and overall participation. (See Attachments A and A10 for further explanation.)

10. Statistical Analysis

See Attachment B.

Deliverables

List the deliverables that were produced or obtained with the funds granted (e.g., reports, plans, education materials, equipment, etc.)
See list of attachments in the table of contents for a list of deliverables produced or obtained, including:

- Narratives description and statistical findings of the monitoring efforts
- Materials developed for use by the charity group volunteers during their outreach efforts
- *Guide to Estimating Numbers and Weights of Recycling Setouts in Dense Neighborhoods*
- Instructions and worksheets for field assistants

Project Budget & Expenses

ITEM	AMOUNT	DETAILS
CVC - Phase 1	$3,870.51	Workplan, Initial route monitoring, sample identification, data reporting, obtaining phone numbers
DPW - Promotion and Outreach	$187.99	Development of recycling materials for charitable partners and Portuguese translation
CVC - Estimation Guide	$1,637.61	Development of guide to standardize estimations recycling set-outs in urban communities
CVC - Phase 2a	$2,777.05	Monitoring 3-months after initial outreach, data reporting and status report
DPW - Promotion and Outreach	$309.75	Advertisement in local newspaper recognizing recycling committers
CVC - Phase 2b	$2,409.80	Monitoring 12-months after initial outreach, data reporting, and status report
CVC - Phase 2c	$797.29	Statistical analysis and feedback on final report
TOTAL	**$11,990.00**	
*** CVC = Clear View Consulting, DPW = Cambridge Department of Public Works		

III. Summary of Results

Findings

Describe the outcome of your efforts, what you learned, answers to questions that were asked, etc. Attach a summary of any data (materials diverted, quantitative and qualitative results, etc.) collected and analyzed.

Outreach
Volunteers spoke with 54% of the HHs in the phone and door groups combined. 12% of the 285 HHs in the phone and door group made a commitment to recycle, with a significantly higher percentage of commitments coming from HHs in the door-knocking method. Volunteers spoke with the majority of HHs during the first outreach attempt (Table R-2).

Phone numbers could not be obtained for 40% of the HHs in the phone group and 11% were disconnected or out of service. We spoke with 38% of non-recyclers in the phone group. Of these 54 HHs, 11% made a commitment to recycle, 48% said no, and 41% said they were already recycling. Close to 100% of the HHs contacted by phone were English speaking.

After three outreach attempts, we spoke with about 70% of HHs in the door group. Close to 30% of the 99 HHs contacted made a commitment to recycle, 28% said no, and 43% said they were already recycling. 44 of the 142 HH in the door group could not be reached, 3 HHs were suspected to be vacant. Close to 90% of the HHs we spoke with were English speaking.

A large percentage of HHs in both the phone and door knocking methods said that they were already recycling. For the combined phone and door groups, 44 buildings with one or more HHs claimed to be already recycling. CVC observed no participation at over 67% of these buildings. There were nine buildings where two or more units said they were already recycling where CVC had estimated that there was only one unidentified participant (Tables R-5 & R-6).

11 of the 142 brochures mailed to HHs in the brochure method were undeliverable.

R-1. Household Responses Following Volunteer Outreach

		Phone	Door-to-Door	Total
	HHs Assigned	143	142	285
HH Response				
	Commitment?	6	29	35
	No	26	27	53
	Already Recycling	22	43	65
Total Responded		54	99	153

R-2. Number of Households Responded to Volunteer Outreach, by Attempt

Attempt	Phone	Door-Knocking	Total
1st	34	51	85
2nd	16	36	52
3rd	4	12	16
TOTAL	54	99	153

R-3 Households Responses by Language: Phone

	English	Portuguese[7]	Other	Total
Yes	6	0	0	6
No	24	0	2	26
Already Recycling	22	0	0	22
Total	52	0	2	54

R-4 Households Responses by Language: Door

	English	Portuguese	Other	Total
Yes	25	4	0	29
No	25	2	0	27
Already Recycling	39	3	1	43
Total	89	9	1	99

[7] One Portuguese speaking resident was identified by phone but we could not find a Portuguese speaking volunteer to call her back.

Table R-5 Analysis of "Already Recycling" Responses: Door

	1 unit said already recycling	2 units said already recycling	3 units said already recycling	6 units said already recycling
Total # of Bldgs	15	5	3	1
Bldgs with 1 Unidentified Participant	4	4	3	1
No Participation Observed at Bldg[8]	11	1	0	0

Table R-6 Analysis of "Already Recycling" Response: Phone

	1 unit said already recycling	2 units said already recycling
Total Number of Buildings	15	3
Buildings with One Unidentified Participant	1	1
No Participation Observed at Building	14	2

Phone outreach was hoped to be equally or more successful than door-to-door outreach. Unfortunately, the number of HHs in the phone method that made a commitment to recycle was surprisingly low, only 4% of the HHs in that group. This low statistic can be partly attributed to difficulties in acquiring working phone numbers for non-recyclers. After accounting for the unavailable phone numbers, 11% percent of responding HHs in the phone group made a commitment to recycle. This was substantially lower than the 29% of HHs in the door-to-door group that made a commitment contacted.

Inherent and external differences existed between the door-to-door and phone group. For example, door knocking was done entirely by youth volunteers with adult chaperones, while by youth volunteers calling from DPW headquarters and untrained adult volunteers calling from their homes did the phone outreach. The phone outreach data may have been compromised since untrained adults did not make the phone calls in a supervised phone-banking atmosphere.

The "cuteness factor" may outweigh the awkwardness or shyness of youth volunteers in a face-to-face encounter but be less accentuated over the phone. Volunteers well versed in recycling may be better candidates for soliciting commitments by phone. Another explanation for the low number of commitments made over the phone might be the general stigma of receiving telemarketing phone calls from strangers.

The percentage of HHs that claimed to be "already recycling" after CVC observed no setouts at the building over 4-5 weeks of monitoring was surprising. This discrepancy may indicate a self-reporting bias by responding HHs, limitations in the ability of the monitoring method to capture certain forms of recycling behavior, mistakes by monitoring staff, or a combination of all three.

The 3-month and 12-month monitoring results for those HHS that claimed to be already recycling suggest a significant degree of self-reporting bias. In the 3-month monitoring:

- 33-38% of the phone “already” group was found to be recycling; therefore at least 62% were not.
- 20-35% of the door “already” group was found to be recycling; therefore at least 65% were not.

In the 12-month monitoring:

- 24-47% of the phone “already” group was found to be recycling; therefore at least 53% were not.
- 13-43% of the door “already” group was found to be recycling; there at least 57% were not.

[8] Includes buildings that had identifiable participants.

Previous studies have shown that self reported recycling behavior is often much higher than the observed behavior. In addition, it may be that for buildings where one unit was judged to be participating, multiple units may have actually been sharing the bin. Certain conservative aspects of CVC's monitoring approach may have overlooked this phenomenon. CVC staff was instructed to treat small quantities of similar items and similarly prepared items as a single setout unless there is specific evidence to the contrary. For example, two single-person HHs with similar tastes and cleanliness habits could each place very small amounts of material in a shared bin. If they set out their shared bin every, or most weeks, there might never be a large enough accumulation of material to have the setout be counted as two separate setouts.

CVC's procedures call for similar looking "non-bin" setouts and setouts in the same bin each week to be treated as a setout from one HH, unless there is specific evidence to the contrary. Therefore, CVC may have placed a sticker an otherwise unmarked bin in the first week of monitoring and kept counting it as a setout from the same HH, even though different HHs may have been using and/or sharing it.

However, it is harder to explain how HHs in buildings with no observed participation might be recycling. One possibility is that they may put recyclables in a neighbor's bin that is not set out in front of their building. CVC staff also observed more than one case where a HH (not in the study) setout the recycling bin several houses further down the street. In this scenario, it would have been impossible for CVC's monitoring methodology to correctly identify such a setout.

Another possibility is that a HH might choose to use the Cambridge Recycling Drop-Off Center rather than recycle in the curbside program, although this is probably not a common occurrence. Finally, it is possible that mistakes could be made and a setout at a given address could be missed. CVC attempted to minimize this possibility with its procedures of training staff, rotating staff among routes and ensuring that they understand that monitoring will be spot-checked. However, in a study involving such a substantial amount of monitoring, some mistakes are to be expected.

Budget Issues

Was the budget adequate? What expenses were not anticipated?
Overall, the Project involved well over 500 hours on the part of CVC and an estimated 125 hours on the part of DPW staff. The most time-consuming tasks in the Project were both the actual monitoring and work involving the databases.

Due to unanticipated planning needs for route revisions and collection order issues, CVC worked 28 additional hours, beyond what had been projected in the original contract. In addition, the original grant of $10,990 did not anticipate the need for the *Estimation Guide*. However, additional funding was approved and money was shifted from other project line items to cover the cost.

Furthermore, a larger budget for this project would have allowed:

- More Field Monitoring

The East Cambridge area was initially divided into three routes during the "Before" monitoring phase which identified non-recycling HHs. The subsequent 3 and 12 month monitoring phases were divided into two areas due to budget restraints. Instead of having three people monitoring, there were two. Since it is harder for two people to stay ahead of the recycling truck the monitoring was started as early as 6:00am.

Additionally, due to budget restraints the originally planned "1-month" monitoring was cancelled. This cancellation has made it impossible to find the dropout rate among "committers" since we could not discern whether "committer" HHs ever began participating in the recycling program.

- Better Analysis of Results

CVC has concluded, "The limitations of this study, both in original design and events during the course of the study, have made it difficult to conduct any rigorous statistical analysis of the results within the very

limited budget and timeframe available. Rather, emphasis has been placed on developing a logical framework for accounting for all the variables in play."

- See "Lessons Learned" for Additional Comments

What expenses were not necessary or critical to the implementation of the project?
The project was implemented with limited funds and therefore all of the expenses were necessary.

Challenges

What obstacles did you face in undertaking this project? How did you overcome those obstacles?

- **Staff Turnover**

Staff turnover has been a major challenge throughout this project. The project's initiator, Jessica Nolan left DPW in July of 2002. A six-month contract employee was also working on this project. Despite staff turnover, the DPW has done a fine job overseeing this project. However, the project was affected by losing Jessica Nolan who was studying the psychology of social marketing in her free time and held a strong personal interest in the Project.

In addition, the temporary workers hired by CVC as field assistants did not show up on several occasions during the project. In one case, the person who committed to the fieldwork quit at the last minute because he found other work. In this instance, CVC began a search for a new field assistant. With help from the DPW, the opportunity was advertised via email to local universities and recycling advocates. This effort enabled CVC to quickly find a competent person who worked throughout the duration of the "12-month" monitoring. Other adjustments in the monitoring schedule were made in the cases when a field assistant did not show up. While this problem did create minor issues for the project, CVC was able to work around them.

- **Change in Collection Routes**

During the Field Assistant training in August of 2002, it became apparent that F. W. Russell, the collection contractor instituted a number of changes in the order that some monitoring routes had been collected since the "Before" phase. CVC did two things to cope with this problem:

- Rearranged parts of both monitoring routes and started monitoring 15-20 minutes earlier.
- Prepared a detailed monitoring route order list including estimated completion times for each street. The collection contractor was given the list with the request that they do not pick up a given street until after those times.

IV. Lessons Learned

What can you tell people who might engage in similar work that would help them in the future?
Most text for the Lessons Learned below has been taken from Attachment C.

1. **When lower ratios are found between setout rates and overall participation, add 1-2 additional weeks of monitoring.**

Throughout many recycling participation studies, CVC has found that the ratio between average setout rates and overall participation is a key statistic to track. In most urban studies, CVC has found that this ratio is usually between 0.65 and 0.75; while in single-family suburbs, it can range as high as 0.85 to 0.90. While this statistic is in one sense a behavioral measure (indicating the average frequency with which households are recycling), it is also of great significance in study design since the lower the ratio, the more weeks of monitoring are necessary to get close to the true overall participation rate.

CVC usually recommends 4-6 weeks of monitoring in urban settings and as few as 3 in suburban settings. Due to budget constraints, the methodology for this Project called for 5 weeks of monitoring.

The ratios found during the study were near or below 0.50, suggesting that 6 weeks of monitoring would have been preferable.

2. Spend More Time and Money to Get a Better Study Sample

Given all the factors that subdivided and whittled down our study groups, it would have been worth extra time and effort to obtain our original goal of 600 HHs with no unidentified participants. To do this, we would have needed to monitor about 25% more HHs at the outset than actually monitored. This would have required starting with 4 monitoring routes instead of 3. Because of the unusually low ratio between average setout rates and overall participation rates in this study area, it would have been desirable to obtain 5 weeks of data on all streets and HHs in the study area. Due to problems with no-shows by several temps, only 4 weeks of data was obtained on roughly a third of the study area.

The estimated additional cost of the above approach would have ranged from $222 if a DPW staff person could have monitored the extra route to $592 otherwise. Ensuring 5 weeks of collected data would have added 1-2 weeks to the timeline, given the level of no-shows encountered.

3. Gather "Before" Data on Overall Participation and Set-Out Weights

In retrospect, it would have been useful to obtain a benchmark of the overall average setout rate and participation rate for study area. The participation rate would have aided our efforts to pinpoint the real impact of HH turnover. This would have been accomplished by continuing to monitor all HHs in the overall study area for 5 weeks, rather than dropping out participants as they were identified. It would also have been worthwhile to collect limited, but representative, weight data for all participants. With this data, we would have had a basis for determining whether the new recycling HHs were setting out smaller amounts of recyclables than other HHs in the area.

The estimated additional cost could have been none if the steps described in Item 2 had been accomplished. Temps could likely have completed the work within 4 hours. Although, one extra temp may have been needed as a weighing assistant for up to 4 days, in which case extra cost would be about $296.

4. Set Study Group Sizes With An Eye Toward Statistical Analysis Needs

In hindsight, all four-study groups should not have been sized equally. This was done based on the assumption that we would compare each of the two active treatment groups in its entirety to the control and brochure mailing groups. In fact, during the implementation of the outreach phase, it became clear that both the phone and door-to-door outreach groups had splintered into four subgroups, of which only the "committers" were directly relevant to our research questions.

At a minimum, the groups could have been sized according to an estimate of the fraction we would be able to contact successfully. This approach can be illustrated using our actual success ratios, a useful starting point. See Attachment C for potential group sizes.

5. Do Limited "One-Month" Monitoring of Committer Households

As noted in the Attachment A, the final study design made it nearly impossible to distinguish "committers" who never actually started recycling from those who started but dropped out by the time of the "3-month" monitoring. To make this distinction, limited monitoring of "committer" addresses within the first month after outreach was necessary.

Such monitoring could not be done by the consultant in any study requiring the consultant to be "blind" as to HH assignments to treatment groups. Thus, it would probably have to be done by client staff. This step would require four to five hours of staff time for 2 weeks of monitoring. The data could simply be filed until the consultant began final analysis of results.

6. Try to Collect More Data/Insights Into Various "Background" Factors

Attachment B identifies a series of factors which anecdotally and/or theoretically would affect either (a) some of the households in any ongoing study of this type, or (b) the measurement results obtained by the study. These background factors included:

- The effect of HH turnover.
- "Peer" effects, in which HH behavior is changed by awareness of other HHs in their building or on their street.
- "Measurement" effects, in which behavior is changed by awareness that the HH is being studied.

See Attachment B for further description of the effects of study assessments of "false positive" and "false negative" of HH recycling.

CVC made some efforts within this study's limited timeframe to ensure that the model of background factors presented in the Statistical Analysis Report was a "best guess".

7. Phone Outreach May Not be a Feasible Outreach Technique
Conducting phone outreach to identified non-recyclers has several obstacles including difficulty getting phone numbers and the prevalence of call screening.

Similar Projects

If you were to do this project or a similar project in the future, what would you do differently or not at all? How would you improve upon what you did? What do you think could be done to eliminate obstacles you encountered?

See "Lessons Learned" section and Attachments A, D and E.

Future Projects

Based on the results of your project, what issues or problems do you think require further study or attention?

For future work in this area, it would be desirable to conduct a much more thorough canvass of work that has been done in participation measurement regarding household turnover and "peer" and "measurement" effects.

CVC has suggested that the next logical test of community-based social marketing as a recycling outreach approach might be a large housing development(s) with low recycling rates. Monitoring could obtain data on recycling diversion results by volume and/or weight before and after community-based social marketing efforts. Retention rates could be tracked on an ongoing basis by continuing periodic diversion measurements.

In addition, it may be helpful to study the relationship between the number and type of items HHs commit to recycle and observed participation. Does committing to recycle more items lead to more recycling? Do people who commit to do more end up doing less? Is there an observed difference in participation between committers who chose to be recognized in the newspaper?